



George C. Marshall Space Flight Center  
Marshall Space Flight Center, Alabama 35812

**QD-QA-022**  
**REVISION F**

**EFFECTIVE DATE: November 22, 2005**

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# **ORGANIZATIONAL ISSUANCE**

## **VISUAL WELD INSPECTION**

### **OPR(s)**

**QD10, QD20, QD30,  
and QD40**

### **OPR DESIGNEE**

**Bobby Rains**

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## DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		1/13/99	
Revision	A	7/1/99	Changes made to reflect new organization code changes and/or Changes made to reflect new directives renumbering scheme and to incorporate the corrective action for closure of NCR 266
Revision	B	6/9/00	Changes made to paragraph 10 to reflect new certification requirements and a general document format update to bring the document inline with the current S&MA OI template.
Revision	C	9/09/02	Format and numbering change to implement requirements of QS-A-001 rev F.
Revision	D	10/07/02	Changes made to reflect new organization and to reflect use of electronic forms. Reworded paragraphs 4.1.1 and 4.2.3 (no change to technical content).
Revision	E	10/1/04	Revised to bring document in compliance with the HQ Rules Review Action (CAITS: 04-DA01-0387). Changes were also made to reflect S&MA organizational name changes (i.e., QS to QD).
Revision	F	11/22/05	Administrative Revision changed OPR

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## TITLE

### 1. PURPOSE, SCOPE, APPLICABILITY (As Required)

1.1. Purpose - This procedure is written to ensure the consistent performance of visual weld inspections.

1.2. Scope – This procedure applies to structural and pressure welding associated with test fixtures and facilities, in accordance with the codes listed in paragraph 2. Qualified quality assurance personnel will perform this procedure.

1.3. Applicability – This instruction is applicable to quality assurance personnel that perform inspection of structural and pressure welding.

### 2. DOCUMENTS (Applicable and/or Reference)

#### 2.1. Applicable Documents

AWS D1.1	Structural Welding Code
ASME/ANSI B31.1	Code for Power Piping
ASME/ANSI B31.3	Code for Chemical Plant and Refinery Piping
TD70-007	Facility Nonconformance Reporting System For The Technology Evaluation Department

2.2. Reference Documents - The following reference documents provide additional information concerning the subject of Visual Weld Inspection:

(Not numbered)	ASME Boiler and Pressure Vessel Code
TD70-9005	Welding Qualifications and Procedures

### 3. DEFINITIONS

3.1. Temporary Attachments. Attachments which are welded to a component during construction that are not incorporated into the final welded joint, such as alignment lugs, thermocouples, tie straps, braces, or other similar items.

3.2. Weld Area. The weld and heat affected area includes areas such as runoff tabs, alignment lugs, thermocouple nuts, and other temporary fit-up welds.

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#### 4. INSTRUCTIONS

##### 4.1. Fit-up and Cleanliness.

4.1.1. The fit-up inspection shall be performed by qualified personnel (normally the performing contractor) in accordance with the methods specified by the applicable process specification, code, and work authorizing documentation. The inspection shall be performed by someone other than the performing welder. The checklist in Appendix A may be used as a guide for the performance of the fit-up examination. Quality assurance personnel may use the checklist when auditing the fit-up process.

4.1.2. The item shall be inspected to ensure the absence of foreign material or debris. Notify welder or welding supervisor if clean up is required.

4.1.3. Acceptance criteria shall be in accordance with applicable process specification, code and work authorizing documentation.

##### 4.2. Visual Inspection.

4.2.1. Visual inspection shall be performed in accordance with the methods specified by the applicable process specification, code, and work authorizing documentation.

4.2.2. Verify personnel are certified for the process and the process is being followed.

4.2.3. Verify a weld map is available, if required.

4.2.4. The weld area where temporary attachments (to facilitate fit-up) are removed shall be examined at the time of visual inspection. NDE may be required in accordance with the process specification. Refer to the appropriate NDE procedure.

4.2.5. When Borescopes or mirrors are used, record in the comments section of the form provided by Appendix B.

4.2.6. Acceptance criteria shall be in accordance with the applicable process specification. If acceptable, stamp and date the work-authorizing document and complete the form provided as Appendix B, MSFC Record of Visual Weld Inspection, if required, or MSFC form 4456, (if work authorizing document is electronic, affix password protected initials/signature) . If the weld is rejected, notify the welder or welding supervisor and engineer. If required, generate appropriate nonconformance documentation per TD70-007.

#### 5. NOTES

5.1. Preliminary Drawings - If the drawing is preliminary, withhold final acceptance stamp on the work authorizing documentation until signed drawings are provided.

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5.2. Directive Replacement - This issuance replaces QS10-QA-022 Revision D, “Visual Weld Inspection”, dated 6/9/00.

5.3. Records are maintained by the Quality Assurance Records Center for flight hardware and by the using organization for test stand and test facility hardware.

## 6. SAFETY PRECAUTIONS AND WARNING NOTES

None

## 7. APPENDICES, DATA, REPORTS, AND FORMS

Appendix A Weld Fit-Up Examination Checklist

Appendix B MSFC Record of Visual Weld Inspection

MSFC Form 4456 “Visual Weld Inspection Report” may also be used to document performance and results of visual weld inspection.

## 8. RECORDS

None

## 9. TOOLS, EQUIPMENT, AND MATERIALS

The following tools may be required to perform to this instruction:

- a. Fillet gauges.
- b. Fit-up gauges.
- c. Mirrors.
- d. Flashlights.
- e. Oxygen sensor

## 10. PERSONNEL TRAINING AND CERTIFICATION

Personnel who perform visual weld inspection shall be American Welding Society (AWS) Certified Weld Inspectors.

## 11. FLOW DIAGRAM

None

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## Appendix A

### WELD FIT-UP EXAMINATION CHECKLIST

TPS/WORK AUTH. # \_\_\_\_\_ DATE \_\_\_\_\_

DWG. # \_\_\_\_\_ WELD PROCEDURE # \_\_\_\_\_

MATERIAL TYPE \_\_\_\_\_ WELD # \_\_\_\_\_

1. Pre-fit-up cleanliness inspection performed \_\_\_\_\_
2. Welder has proper welding procedure specification \_\_\_\_\_  
(with reference to the procedure qualification record)
3. Welder has applied I. D. to joint \_\_\_\_\_
4. Welder has correct filler material \_\_\_\_\_
5. Oversized root openings corrected by welding \_\_\_\_\_
6. Welder is certified for the process \_\_\_\_\_
7. The correct weld number is applied to the joint \_\_\_\_\_
8. Material identification \_\_\_\_\_
9. Cleanliness of welding surfaces \_\_\_\_\_
10. Weld edge preparation, dimensions and finish \_\_\_\_\_
11. Clearance dimensions of backing strips, and rings or consumable inserts \_\_\_\_\_
12. Alignment, mismatch and fit-up \_\_\_\_\_
13. Tack welds removed or suitable to weld over \_\_\_\_\_
14. Temporary attachments handled per procedure \_\_\_\_\_
15. The proper preheat has been established and is maintained \_\_\_\_\_
16. Correct purge equipment is used \_\_\_\_\_
17. Socket welds properly marked to ensure socket withdrawal \_\_\_\_\_

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## Appendix B

### MSFC RECORD OF VISUAL WELD INSPECTION

TPS/WORK AUTH# \_\_\_\_\_ PROG./PROJ. \_\_\_\_\_

INSP. DATE \_\_\_\_\_ DWG. # \_\_\_\_\_

WELD PROCEDURE # \_\_\_\_\_ WELD # \_\_\_\_\_

ACCEP. SPEC. # \_\_\_\_\_ NASA FIT-UP INSP yes/no

MATERIAL TYPE \_\_\_\_\_

WELD SIZE \_\_\_\_\_

DEFECTS NOTED:

DEFECT	ACCEPT	REJECT
CLEANLINESS & SPATTER		
CONTOUR & REINFORCEMENT		
POROSITY & CRATERS		
WELD SIZE & TRANSITION		
LOF		
LOP		
OVERLAP		
UNDERCUT		
OTHER (SPECIFY)		

REPAIR: ACC \_\_\_\_\_ REJ \_\_\_\_\_

COMMENTS: \_\_\_\_\_

INSPECTOR \_\_\_\_\_ STAMP \_\_\_\_\_ DATE \_\_\_\_\_

EMPLOYER \_\_\_\_\_